



**21<sup>st</sup> International Conference/Summer School**

**NONLINEAR SCIENCE AND COMPLEXITY**

*Athens, July 21 – August 2, 2008*

*Lecture Hall, Main Library, National Technical University*

## **LECTURE PROGRAM**

*Sponsored by:*

Ministry of Education (Department of Conferences), Ministry of Foreign Affairs (Secretariat of Hellenic Diaspora), National Polytechnic of Athens, University of Patras

*organized by:*

**NATIONAL TECHNICAL UNIVERSITY OF ATHENS**

**AND**

**NATIONAL CENTER FOR SCIENTIFIC RESEARCH “DEMOKRITOS”**

<http://limnos.chem.demokritos.gr/cosa>, <http://www.math.upatras/~crans>

## MONDAY, 21 JULY

Chairman: K. Hizanidis

### Morning Session: 09:30 – 13:30

---

- 09:30 – 10:30 **Registration – Greetings – Introductory Remarks**  
K. Hizanidis (Athens), T. Bountis (Patras), A. Provata (Demokritos)
- 10:30 – 11:30 **Electromagnetoencephalography for the 3-shell Model: Distributed Current in Arbitrary, Spherical and Ellipsoidal Geometry**  
A. Fokas (Cambridge)
- 11:30 – 12:00 *Coffee Break*
- 12:00 – 13:00 **Stickiness**  
G. Contopoulos (Athens)

### Afternoon Session: 15:00 – 17:00

---

- 15:00 – 16:00 **The Dynamics of Normal Mode Excitations in Fermi Pasta Ulam Lattices**  
C. Efthymiopoulos (Athens)
- 16:00 – 17:00 **Coffee/Discussion/Posters**
- 

## TUESDAY, 22 JULY

Chairperson: A. Provata

### Morning Session: 09:30 – 13:00

---

- 09:30 – 10:30 **A Nonlinear Dynamics Perspective of Wolfram's New Kind of Science I**  
L. Chua (Berkeley)
- 10:30 – 11:30 **A Nonlinear Dynamics Perspective of Wolfram's New Kind of Science II**  
L. Chua (Berkeley)
- 11:30 – 12:00 *Coffee Break*
- 12:00 – 13:00 **Energy Localization in Large Molecules and Large Scale Computations on Grid Infrastructures**  
S. Farantos (Heraclion)

### Afternoon Session: 15:00 – 17:00

---

- 15:00 – 16:00 **The Chaotic Set of a Hamiltonian Scattering System With 3 Degrees of Freedom**  
C. Jung (Cuernavaca)
- 16:30 – 17:00 **Coffee/Discussion/Posters**
- 

## WEDNESDAY, 23 JULY

Chairman: C. Jung

### Morning Session: 09:00 – 13:00

---

- 09:30 – 10:30 **The Stability of Retrograde Orbits in (Astro)dynamical Systems**  
R. Dvorak (Vienna)
- 10:30 – 11:30 **Biological Applications of Nonlinear Dynamics**  
E. Mosekilde (Lyngby)

- 11:30 – 12:00 *Coffee Break*  
12:00 – 13:00 *The Role of Noise in Biological Information Processing*  
J. Nicolis (Athens)

**Afternoon Session: 15:00 – 17:00**

---

- 15:00 – 16:00 *Nonlinear Dynamics in Economic Models*  
J. Sterman (Cambridge, USA)  
16:00 – 16:30 *Fractal Analysis of Human Brain Tractography Images*  
P. Katsaloulis (Athens)  
16:30 – 17:00 *Coffee/Discussion/Posters*
- 

**THURSDAY, 24 JULY**

*Chairman: R. Dvorak*

**Morning Session: 09:30 – 13:00**

---

- 09:30 – 10:30 *Group-theoretical Methods for Studying Nonlinear Dynamics of Physical Systems With Discrete Symmetries*  
G. Chechin (Rostov-on-Don)  
10:30 – 11:30 *Localization Versus Delocalization in Nonlinear Disordered Systems*  
S. Flach (Dresden)  
11:30 – 12:00 *Coffee Break*  
12:00 – 13:00 *Heat Conduction and Fourier's Law by Two-stage Local Thermalization*  
T. Gilbert (Brussels)

**Afternoon Session: 15:00 – 17:00**

---

- 15:00 – 15:30 *Stability of Nonlinear Normal Modes in the FPU- $\beta$  Chain in the Thermodynamic Limit*  
D.S.Ryabov (Rostov-on-Don)  
15:30 – 16:00 *Group-theoretical Methods for Simplification of Stability Analysis of Dynamical Regimes in Nonlinear Systems With Discrete Symmetries*  
K. G. Zhukov (Rostov-on-Don)  
16:00 – 16:30 *Synchronization of Local Oscillators in a Lattice Model*  
A. Provata (Athens)  
16:30 – 17:00 *Coffee/Discussion/Posters*

**FRIDAY, 25 JULY**

*Chairman: S. Flach*

**Morning Session: 09:30 – 13:00**

---

- 09:30 – 10:30 *Are the Fractal Skeletons the Explanation for the Plankton Paradox and the In-stent Restenosis?*  
C. Grebogi (Aberdeen)  
10:30 – 11:30 *Intra- and Inter-Nephron Synchronization in Renal Autoregulation*  
E. Mosekilde (Lyngby)  
11:30 – 12:00 *Coffee Break*  
12:00 – 13:00 *Nonlinear Analysis of Univariate and Multivariate Time Series*  
D. Kugiumtzis (Thessaloniki)

**Afternoon Session: 15:00 – 17:00**

---

- 15:00 – 15:30 *Fermi Acceleration and the Annular Billiard*  
R. Egydio de Carvalho (Rio Claro)
- 15:30 – 16:00 *Fermi Acceleration in Prototype Time Dependent Billiards*  
A. Karlis (Athens)
- 16:00 – 17:00 **Coffee/Discussion/Posters**
- 

**SATURDAY, 26 JULY**

*Chairman: T. Bountis*

**Morning Session: 9:30 – 13:00**

---

- 9:30 – 10:30 *Singularity Analysis Revisited*  
P.G.L. Leach (Durban)
- 10:30 – 11:30 *Nonlinear Processes on the Electron Cyclotron Radio Heating of Fusion Devices*  
C. Tsironis (Thessaloniki)
- 11:30 – 12:00 *Coffee Break*
- 12:00 – 12:30 *Chaos Detection Techniques*  
Ch. Skokos (Dresden)
- 12:30 – 13:00 *Parameter Identification of Fractal Interpolation Functions: An Application to Medical Imaging*  
V. Drakopoulos (Athens)
- 

**SUNDAY, 27 JULY**

**EXCURSION to Marathon for sight seeing and swimming**

---

**MONDAY, 28 JULY**

*Chairman: A. Bezerianos*

**Morning Session: 09:30 – 13:00**

---

- 09:30 – 10:30 *Critical Flow and Pattern Formation of Granular Matter on a Conveyor Belt*  
J. P. van der Weele (Patras)
- 10:30 – 11:30 *Non-standard Pattern Formation During Self-organization Within a New Paradigm of Macromolecular Crystallization*  
V. Basios (Brussels)
- 11:30 – 12:00 *Coffee Break*
- 12:00 – 13:00 *Monitoring of Final Pre-seismic Phases From their Electromagnetic Precursors in Terms of Extensive and Non-extensive Statistical Mechanics*  
K. Eftaxias (Athens)

**Afternoon Session: 15:00 – 17:00**

---

- 15:00 – 15:30 *Chemical Perturbations on Oscillatory Electrochemical Interfaces: From Multistability and Relaxation Oscillations to Synchronized Bursters*  
A. Karantonis (Athens)

15:30 – 16:00 *Existence and Stability of Localized Structures in Hexagonal and Honeycomb Lattices*

V. Koukouloyannis (Thessaloniki)

16:00 – 17:00 *Coffee/Discussion/Posters*

## TUESDAY, 29 JULY

Chairman: J.P. van der Weele

**Morning Session: 09:30 – 13:00**

---

09:30 – 10:30 *Phase Synchronization of Neurons in Brain Diseases*

J. Kurths (Berlin)

10:30 – 11:30 *Entropy Measures for Studying Brain Dynamics*

A. Bezerianos (Patras)

11:30 – 12:00 *Coffee Break*

12:00 – 13:00 *Geometrical Approach to Description of the Evolution of Vortices*

T. Dobrowolski (Cracow)

**Afternoon Session: 15:00 – 17:00**

---

15:00 – 15:30 *Chaos in Simple Rotation-Translation Models*

Ch. Skiadas (Chania)

15:30 – 16:00 *The Patterns Method of Measuring Chaos*

I. Sideris (Zürich)

16:00 – 17:00 *Coffee/Discussion/Posters*

---

## WEDNESDAY, 30 JULY

Chairman: M. N. Vrabatis

**Morning Session: 09:30 – 13:00**

---

9:30 – 10:30 *Three-Dimensional Spatio-Temporal Vortex Lattices*

K. Hizanidis (Athens)

10:30 – 11:30 *Lattice Solitons in Photonic Structures*

Y. Kominis (Athens)

11:30 – 12:00 *Coffee Break*

12:00 – 13:00 *New Trends in Hamiltonian Quantum Chaos*

M. Robnik (Maribor)

**FREE AFTERNOON**

---

## THURSDAY, 31 JULY

Chairman: M. Robnik

**Morning Session: 09:30 – 13:00**

---

09:30 – 10:30 *Stability and Chaos in Multidimensional Hamiltonian Systems*

T. Bountis (Patras)

- 10:30 – 11:30 *Singularities of Dynamical Systems*  
S. Pnevmatikos (Patras)
- 11:30 – 12:00 *Coffee Break*
- 12:00 – 12:30 *Singularities in Geometric Gauge Theory*  
K. Kourliouros (Patras)
- 12:30 – 13:00 *Detecting Dynamical Regime Changes: Hamiltonian Description of a Microplasma System*  
C. Antonopoulos(Brussels-Patras)

---

**Afternoon Session: 15:00 – 17:00**

- 15:00 – 15:30 *Which Types of Chaotic Motion in Barred Galaxy Models Could Be Actually Detected in Barred Galaxies?*  
Th. Manos (Patras-Marseille)
- 15:30 – 16:00 *Nonlinear Time Series Analysis in a Turbulent Channel Flow*  
T. Karakasidis (Volos)
- 16:00 – 17:00 *Coffee/Discussion/Posters*
- 

**FRIDAY, 1 AUGUST**

*Chairman: T. Bountis*

---

**Morning Session: 09:30 – 13:00**

- 09:30 – 10:30 *Dark Solitons in Bose-Einstein Condensates*  
D. Frantzeskakis (Athens)
- 10:30 – 11:30 *The Many Faces of "Discreteness": From Acoustic Crystals and Layered Optical Media to Multi-Component Bose-Einstein Condensates and Beyond*  
P. Kevrekidis (Amherst)
- 11:30 – 12:00 *Coffee Break*
- 12:00 – 13:00 *Evolutionary Algorithms and Applications to Nonlinear Systems*  
M. Vrahatis (Patras)

---

**Afternoon Session: 15:00 – 17:00**

- 15:00 – 16:00 *Existence and Stability of Solitons in DNLS With Saturable Nonlinearity*  
V. Rothos (Thessaloniki)
- 16:00 – 17:00 *Coffee/Discussion/Posters*
- 

**SATURDAY, 2 AUGUST**

*Chairpersons: K. Hizanidis, T. Bountis and A. Provata*

- 09:30 – 10:30 *Dynamics and Information Geometry*  
D. Ghikas(Patras)
- 10:30 – 11 :30 *Discussion of the Results*
- 11:30 – 12:30 *Preparation of the 22nd Summer School, July 2009*
-